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Date of Filing	:	25 JANUARY 2000
Application Number	:	200000431-7
Applicant(s)	:	MOLEX INCORPORATED
Title of Invention	:	ELECTRICAL CONNECTOR WITH MOLDED PLASTIC HOUSING

Tan Kar Leng (Miss)
Assistant Registrar
for REGISTRAR OF PATENTS
SINGAPORE
17 JANUARY 2001

PATENTS FORM 1

SINGAPORE
PATENTS ACT
(CHAPTER 221)
PATENTS RULES

Rule 19

The Registrar of Patents
Registry of Patents

REQUEST FOR THE GRANT OF A PATENT

THE GRANT OF A PATENT IS REQUESTED BY THE UNDERSIGNED ON THE PRESENT APPLICATION

I. Title of Invention	ELECTRICAL CONNECTOR WITH MOLDED PLASTIC HOUSING	
II.Applicant(s) (see note 2)	*(a) Name*	MOLEX INCORPORATED
	Body Description/ Residency	INCORPORATED IN DELAWARE, U.S.A.
	Street Name & Number	2222 WELLINGTON COURT.
	City	LISLE, IL 60532
	State	
	Country	United States of America
	(b) Name	
	Body Description/ Residency	
	Street Name & Number	
	City	
	State	
	Country	
	(c) Name	
	Body Description/ Residency	
	Street Name & Number	
	City	
	State	
	Country	

MJ/CNN /kn/PAT/8018857

200000431-7

III. Declaration of Priority (see note 3)	*Country/Country Designated*		*File no.*	
	Filing Date			[redacted]
	Country/Country Designated		*File no.*	
	Filing Date			[redacted]
	Country/Country Designated		*File no.*	
	Filing Date			[redacted]

IV. Inventors (See note 4)				
(a) The applicant(s) is/are the sole/joint inventor(s).		*Yes*	X	*No*
(b) A statement on Patents Form 8 is/will be furnished.	X	*Yes*		*No*

V. Name of Agents (if any) (See note 5)	**DREW & NAPIER**			
VI. Address for Service (See note 6)	*Block/Hse No*		*Level No*	
	Unit No/PO Box	**152**	*Postal Code*	**900302**
	Street Name	**ROBINSON ROAD**		
	Building Name			
VII. Claiming an earlier filing date under section 20(3), 26(6) or 47(4). (See note 7)	*Application No*	---		
	Filing Date			[redacted]

[Please tick in the relevant space provided]:

( ) Proceeding under rule 27(1)(a).

Date on which the earlier application was amended = _____

or

( ) Proceeding under rule 27(1)(b)

VIII. Invention has been displayed at an International Exhibition (See note 8)	[ ] *Yes* [X] *No*
IX. Section 114 requirements (see note 9)	The invention relates to and/or used a micro-organism deposited for the purposes of disclosure in accordance with section 114 with a depositary authority under the Budapest Treaty. [ ] *Yes* [X] *No*

X. Check List
(To be filled in by applicant or agent)

A. The application contains the following number of sheet(s):-

1. Request	4	*sheets*
2. Description	6	*sheets*
3. Claim(s).	2	*sheets*
4. Drawing(s).	3	*sheets*
5. Abstract.	1	*sheets*

B. The application as filed is accompanied by:-

1. Priority document	
2. Translation of priority document	
3. Statement of Inventorship & right to grant	X
4. International Exhibition Certificate	

XI. Signature(s)
(see note 10)

Applicant (a)	DREW & NAPIER
Date	24 JAN 2000
Applicant (b)	
Date	
Applicant (c)	
Date	

NOTES:

1. This form when completed, should be brought or sent to the Registry of Patents together with the prescribed fee and 3 copies of the description of the invention, and of any drawings.

2. Enter the name and address of each applicant in the space provided at paragraph II. Names of individuals should be indicated in full and the surname or family name should be underlined. The names of all partners in a firm must be given in full. The place of residence of each individual should also be furnished in the space provided. Bodies corporation should be designated by their corporate name and country of incorporation and, where appropriate, the state of incorporation whithin that country should be entered where provided. Where more than three applicants are to be named, the name and address of the fourth and any further applicants should be given on a sheet attached to this Form together with the signature of each of these further applicants.

3. The declaration of priority at paragraph III should state the date of the previous filing, the country in which it was made, and indicated the file number, if available. Where the application relied upon in an International Application or a regional patent application e.g. European patent application, one of the countries designated in that application [being one falling under the Patents (Conventional Countries) Order] should be identified and the name of that country should be entered in the space provided.

4. Where the applicant or applicants is/are the sole inventor or the joint inventors, paagaph IV should be completed by making the 'YES' Box in the declaration (a) and the 'NO' Box in the alternative statement (b). Where this is not the case, the 'NO' Box in declaration (a) should be marked and a statement will be required to be filed on Patents Form 8.

5. If the applicant has appointed an agent to act on his behalf, the agent's name should be indicated in the spaces available at paragraph V.

6. An address for service in Singapore to which all documents may be sent must be stated at paragraph VI. It is recommended that a telephone number be provided if an agent is not appointed.

7. Where an application is made by virtue of section 20(3), 26(6) or 47(4), the appropriate section should be identified at paragraph VII and the number of the earlier application or any patent granted thereon identified.

8. When the applicant wishes an earlier disclosure of the invention by him at an International Exhibition to be disregarded in accordance with section 14(4)(c), then the 'YES' box at paragraph VIII should be maked. Otherwise the 'NO' box should be marked.

9. Where in disclosing the invention the application refers to one or more micro-organisms deposited with a depository authority under the Budapest Treaty, then the "YES" box at paragraph XI should be marked. Otherwise the "NO" box should be marked.

10. Attention is drawn to rules 90 and 105 of the Patent Rules 1995. Where there are more than three applicants, see also Note 2 above.

11. Applicants resident in Singapore are reminded that if the Registry of Patents considers that an application contains information the publication of which might be prejudicial to the defence of Singapore or the safety of the public, it may prohibit or restrict its publication or communication. Any person resident in Singapore and wishing to apply for patent protection in other countries must first obtain permission from the Singapore Registry of Patents unless they have already applied for a patent for the same invention in Singapore. In the latest case, no application should be made overseas until at least two months after the application has been filed in Singapore.

For Offcial Use

Application Filing Date	:	/ /
Request recieved on	:	/ /
Fee received on	:	/ /
Amount	:	/ /

* Cash/Cheque/Money Order No :

** Delete whichever is inapplicable*

SPECIFICATION

ELECTRICAL CONNECTOR WITH MOLDED PLASTIC HOUSING

Field of the Invention

This invention generally relates to the art of electrical connectors and, particularly, to an electrical connector having a molded plastic housing which is configured to reduce warpage.

Background of the Invention

Electrical connectors generally include some form of dielectric housing mounting a plurality of conductive terminals which establish an interconnecting interface between a complementary mating connector, a printed circuit board, discrete electrical wires or any variety of other connecting devices. The terminals typically are mounted within terminal-receiving passages formed in the dielectric housing. Most often, the housing is molded of plastic material, and problems continue to be encountered because the housing is so fabricated.

More particularly, many electrical connectors having molded plastic housings which are considerably elongated. The elongated housings are highly susceptible to becoming bowed or warped, resulting in the terminals or at least the termination portions of the terminals not being in a straight line or in a given plane. The terminal portions become offset relative to each other and result in inferior or incomplete connections. Consequently, many connectors are molded with reinforcing or rigidifying flanges to prevent the housings from bowing. Unfortunately, when the housings become considerably elongated, these reinforcing flanges have the opposite affect of, themselves, causing warping in the molded plastic material due to uneven flow patterns during molding which, in turn, are caused by the uneven wall thicknesses created by the flanges. This invention is directed to solving these problems and the described dilemma presented in designing the molded plastic housings of elongated electrical connectors.

Summary of the Invention

An object, therefore, of the invention is to provide a new and improved electrical connector of the character described.

In the exemplary embodiment of the invention, the connector includes a molded plastic housing having an elongated body portion defining a front mating face and a rear terminating face of the connector. A plurality of terminal-receiving passages are defined by wall means extending between the mating and terminating faces. The wall means are of generally uniform thickness between the faces to allow for even flow patterns of the plastic material during molding. A plurality of conductive terminals are mounted in the terminal-receiving passages.

As disclosed herein, the wall means include outside walls on opposite sides of the elongated body portion. The molded plastic housing includes enlarged end portions at opposite ends of the elongated body portion which is narrower than the end portions.

The connector is shown as a combination connector with the elongated body portion comprising a data section of the connector and the terminals comprising relatively smaller, closely spaced signal terminals. One of the enlarged end portions of the housing comprises a power section of the connector, and a plurality of relatively larger power terminals are mounted in the power section.

Other objects, features and advantages of the invention will be apparent from the following detailed description taken in connection with the accompanying drawings.

Brief Description of the Drawings

The features of this invention which are believed to be novel are set forth with particularity in the appended claims. The invention, together with its objects and the advantages thereof, may be best understood by reference to the following description taken in conjunction with the accompanying drawings, in which like reference numerals identify like elements in the figures and in which:

FIGURE 1 is a front perspective view of an elongated electrical connector according to the prior art;

FIGURE 2 is a vertical section taken generally along line 2-2 of Figure 1;

FIGURE 3 is a front perspective view of an elongated electrical connector incorporating the concepts of the invention; and

FIGURE 4 is a vertical section taken generally along line 4-4 of Figure 3.

Detailed Description of the Preferred Embodiment

Referring to the drawings in greater detail, and first to Figures 1 and 2, an elongated electrical connector, generally designated 10, is shown according to the prior art. The connector is of the general type as might be found in U.S. Patent No. 5,584,709, dated December 17, 1997 and assigned to the assignee of the present invention. In particular, the connector of that patent and the connectors shown herein are combination ("combo") connectors which include three sections spaced lengthwise of the respective connector. The sections herein are generally designated 12, 14 and 16. Section 12 will be termed the data section of the connector and includes a plurality of signal terminals, generally designated 18. Section 14 will be termed the options section of the connector and include a plurality of pin terminals, generally designated 20, having pin portions 20a disposed in a center recessed area 22 for mating with terminals of a complementary connecting device or mating connector (not shown). Section 16 will be termed the power section of the connector and includes four large terminals 24 located in an end recessed area 26 for mating with the power terminals of the complementary mating connector.

Prior art connector 10 includes an elongated dielectric housing, generally designated 28, which, as best seen in Figure 1, is of the same width **W** along the entire length of the connector. The housing defines a front mating face 30 and a rear terminating face 32. Data section 12 has a reduced-width, "D-shaped" projecting portion 34 for insertion into a complementary D-shaped receptacle of the complementary connecting device or mating connector.

Referring to Figure 2 in conjunction with Figure 1, it can be seen that the D-shaped projecting portion 34 is narrower than the width of housing 28 which runs the length of the connector. The uniform width of the housing along the entire length thereof is provided, in part, by flanges 36 which project outwardly from side walls 38 of the D-shaped receptacle. These flanges 36 provide reinforcement or rigidity for the elongated housing in the area of data section 12. However, it has been found that these flanges 36 in housing 28 of prior art connector 10 create uneven flow patterns of

the molten plastic when housing 28 is molded. The uneven flow patterns are particularly prevalent at the junctures of side walls 38 and flanges 36 at opposite ends 12a and 12b of data section 12.

Figures 3 and 4 show a "combo" connector, generally designated 40, according to the invention. Like reference numerals have been applied in Figures 3 and 4 corresponding to like components described above in relation to prior art connector 10 in Figures 1 and 2. Figure 4 shows that data terminals 18 include contact portions 18a projecting forwardly into the "D-shaped" portion 34 of data section 12. The terminals have terminating portions 18b extending rearwardly beyond terminating face 32 of the housing for engaging the contact pads on opposite sides of a printed circuit board inserted between the terminating portions 18b. The terminals have enlarged body portions 18c having teeth 18d which are press-fit into terminal-receiving passages 42.

As best understood in comparing Figure 3 with the prior art of Figure 1, the invention contemplates molding elongated data section 12 of housing 28 with an elongated central body portion, generally designated 28a (Fig. 3), which is of a uniform, but reduced width between mating face 30 and terminating face 32 of the data section. The reduced-width body portion 28a is located between enlarged or wider end portions 28b and 28c, with end portion 28c of the housing running all the way to the opposite end of the connector through power section 16.

The result of providing body portion 28a with a uniform width can best be seen in Figure 4. The outsides of terminal-receiving passages 42 are bounded by side walls 44 that have uniform thicknesses between mating face 30 and terminating face 32. These uniform-thickness walls, in turn, allow for a very even flow pattern of the molten plastic material during the molding of the connector housing. The even flow pattern significantly reduces or minimizes warpage of the connector housing in the area of elongated body portion 28a of data section 12.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit or central characteristics thereof. The present

examples and embodiments, therefore, are to be considered in all respects as illustrative and not restrictive, and the invention is not to be limited to the details given herein.

WHAT IS CLAIMED IS:

1. An electrical connector (40), comprising:

a molded plastic housing (28) having an elongated body portion (28a) defining a front mating face (30) and a rear terminating face (32) of the connector, a plurality of terminal-receiving passages (42) defined by wall means (44) extending between said mating and terminating faces, and said wall means (44) being of generally uniform thickness between the faces (30,32); and

a plurality of conductive terminals (18) mounted in said terminal-receiving passages (42).

2. The electrical connector of claim 1 wherein said wall means include outside walls (44).

3. The electrical connector of claim 1 wherein said molded plastic housing (28) includes enlarged end portions (28b,28c) at opposite ends of said elongated body portion (28a), the body portion being narrower than the end portions.

4. The electrical connector of claim 3 wherein said connector (40) is a combination connector with said elongated body portion (28a) including a data section (12) of the connector and at least one of said enlarged end portions (28c) including a power section (16) of the connector.

5. The electrical connector of claim 4 wherein said terminals (18) are signal terminals and said power section (16) includes at least one power terminal (24) mounted therein.

6. An electrical connector (40), comprising:

a molded plastic housing (28) having an elongated body portion (28a) longitudinally extending between opposite end portions (28b,28c), a plurality of terminal-receiving passages (42) extending transversely through the body portion, and the end portions (28b,28c) being wider than the body portion (28a) therebetween; and

a plurality of conductive terminals (18) mounted in said terminal-receiving passages (42).

7. The electrical connector of claim 6 wherein said passages (42) are at least in part defined by outside walls (44) of the elongated body portion (28a), the walls (44) being of generally uniform thickness throughout.

8. The electrical connector of claim 6 wherein said connector (40) is a combination connector with said elongated body portion (28a) including a data section (12) of the connector and at least one of said end portions (28c) including a power section (16) of the connector.

9. The electrical connector of claim 8 wherein said terminals (18) are signal terminals and said power section (16) includes at least one power terminal (24) mounted therein.

ABSTRACT OF THE DISCLOSURE

An electrical connector (40) includes a molded plastic housing (28) having an elongated body portion (28a) defining a front mating face (30) and a rear terminating face (32) of the connector. A plurality of terminal-receiving passages (42) are defined by walls (44) extending between the mating and terminating faces. The walls (44) are of generally uniform thickness between the faces (30,32) to provide an even flow pattern for the plastic material of which the housing is molded. A plurality of conductive terminals (18) are mounted in the terminal-receiving passages (42).

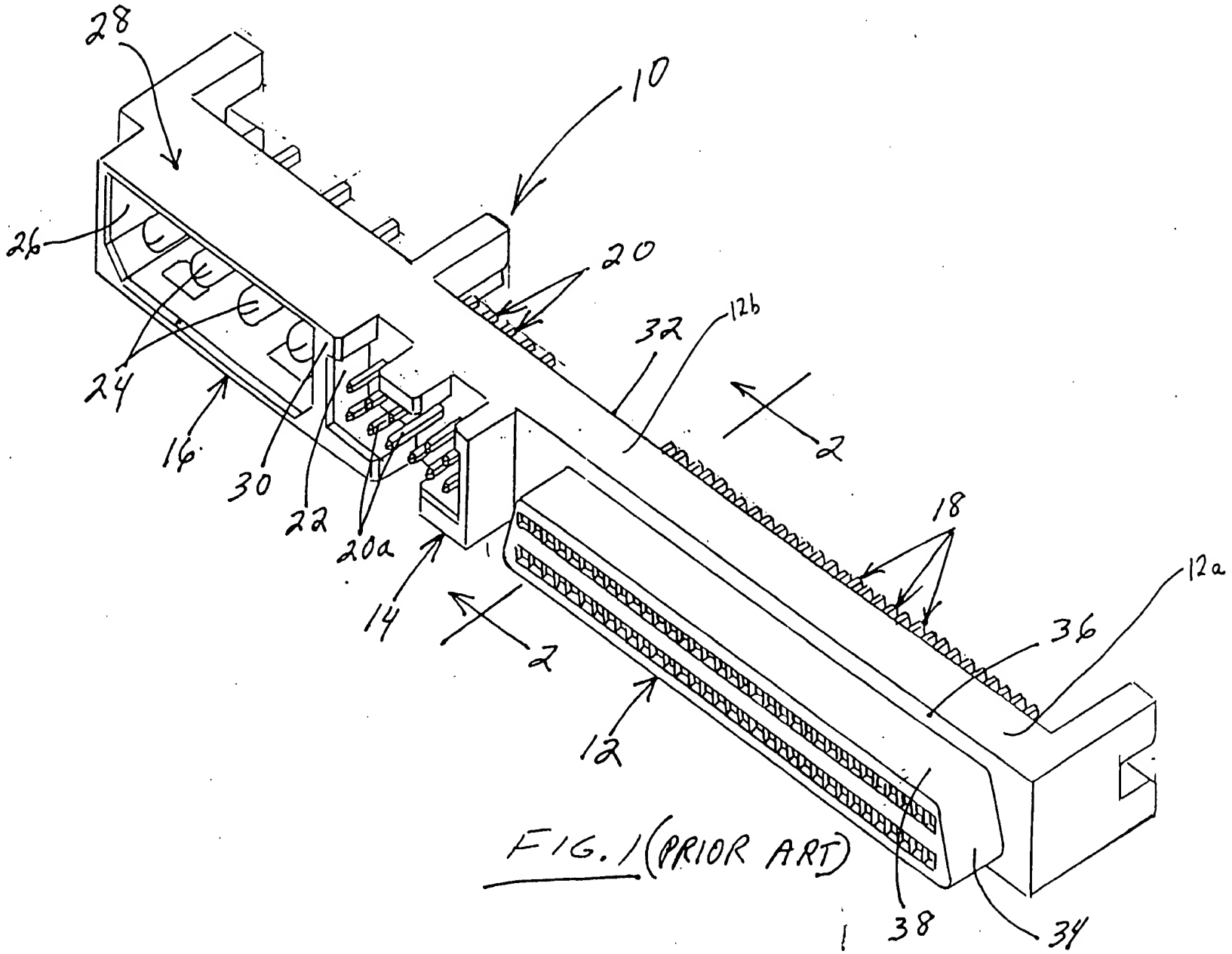

FIG. 1 (PRIOR ART)

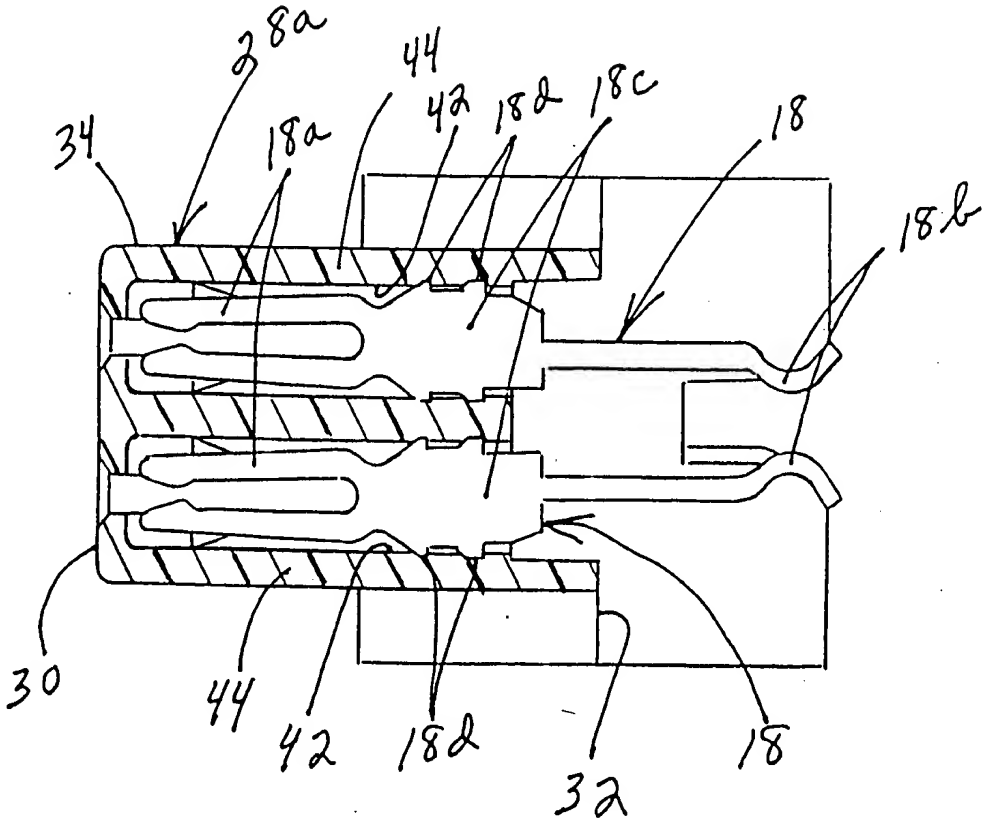

FIG. 4

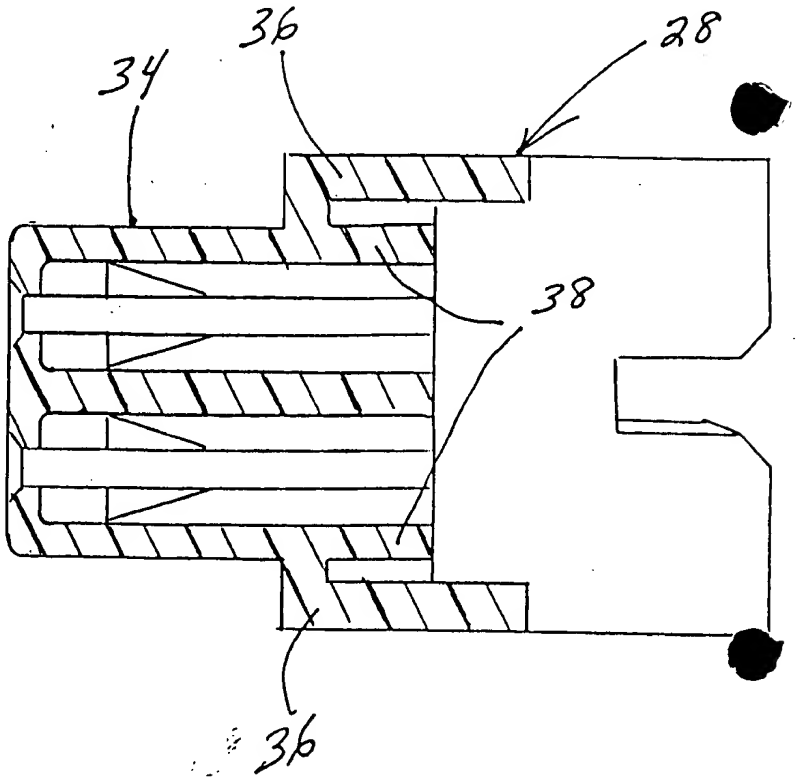

FIG. 2 (PRIOR ART)

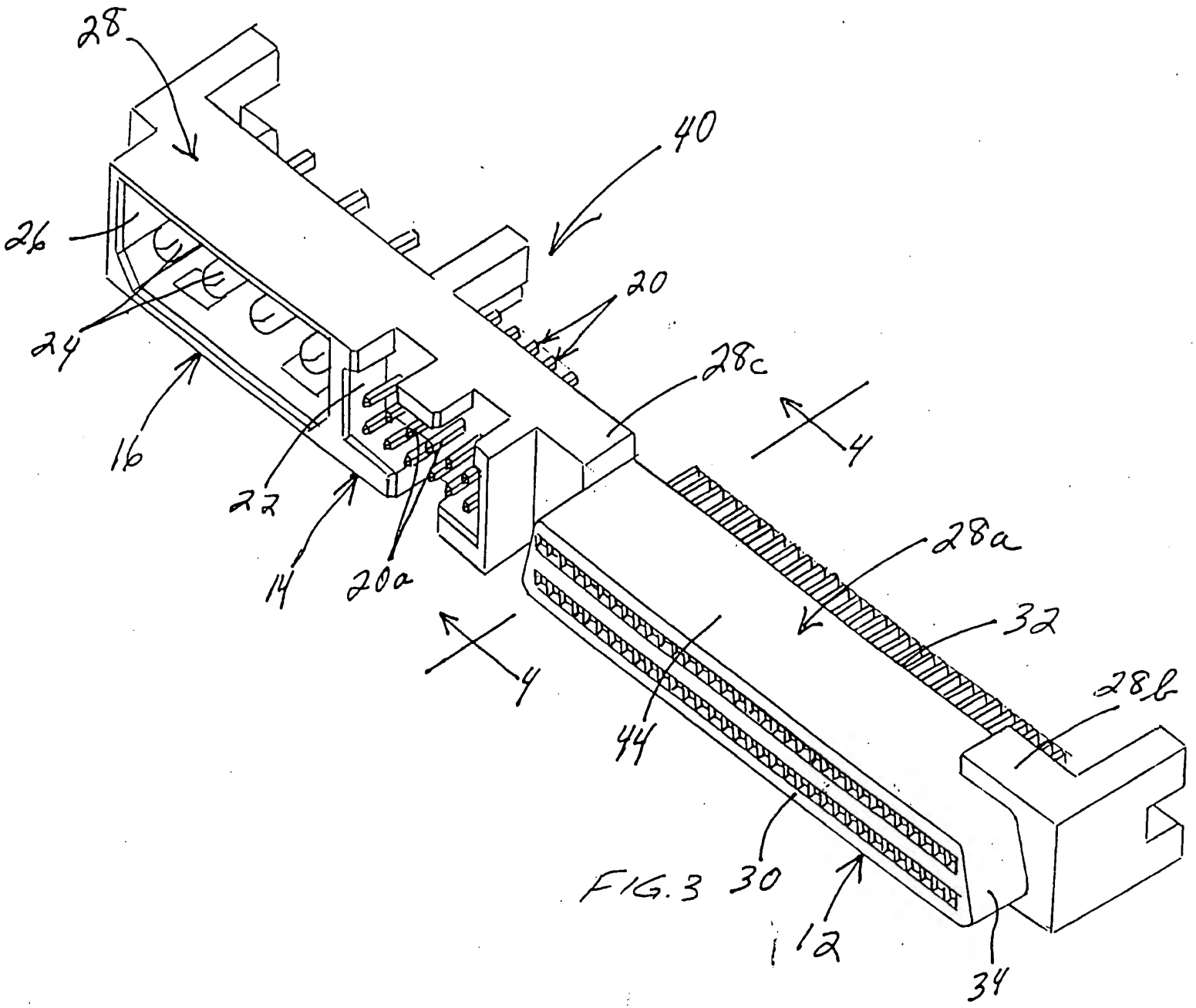

FIG. 3